2 June 2014 - Extreme summer rainfall may become more frequent in the UK due to climate change, according to new research led by the Met Office in collaboration with Newcastle University.

The new study, from the joint Met Office and NERC funded CONVEX project, uses a state-of-the-art climate model providing the first evidence that hourly summer rainfall rates could increase.

While summers are expected to become drier overall by 2100, intense rainfall indicative of serious flash flooding could become several times more frequent.

The results from the study, published in Nature Climate Change , are the first step towards building a more complete picture of how UK rainfall may change as our climate warms.

Dr Lizzie Kendon, lead author of the research at the Met Office, said: "Until now, climate models haven't been able to simulate how extreme hourly rainfall might change in future. The very high resolution model used in this study allows us to examine these changes for the first time.

"It shows heavier summer downpours in the future, with almost five times more events exceeding 28mm in one hour in the future than in the current climate - changes we might expect theoretically as the world warms. However, we need to be careful as the result is only based on one model - so we need to wait for other centres to run similarly detailed simulations to see whether their results support these findings."

As the atmosphere warms it can hold more moisture and this is expected to intensify rainfall. However, research is needed to understand what this might mean for extremes and how this might affect the UK.

In winter it is the daily or multi-day rainfall totals that are important, because we tend to get steady, long-lasting periods of rain from large scale weather systems - similar to those seen during the winter floods of 2013/14.

Climate models, which generally work at coarse resolutions, have been able to accurately simulate winter rainfall and have suggested generally wetter winters with the potential for higher daily rainfall rates in the future.

In summer, however, it is the hourly rates that are more important as rain tends to fall in short but intense bursts - as seen during the Boscastle flooding of 2004 and 'Toon Flood' in Newcastle in 2012. Climate models have so far lacked the resolution to accurately simulate the smaller-scale convective storms which cause this type of rain.

To deal with this issue, this study uses a climate model with a higher resolution than ever used before to examine future rainfall change - using 1.5km grid boxes instead of the usual 12km or larger - the same as the Met Office weather forecast model. This model gives a realistic representation of hourly rainfall, allowing us to make future projections with some confidence.

It was so computer intensive that only the southern half of the UK could be studied and even then it took the Met Office supercomputer - one of the most powerful in the world - about nine months to run the simulations.

These simulations looked at two 13-year periods, one based on current climate and one based on expected climate around 2100.

Prof Hayley Fowler, from Newcastle University's School of Civil Engineering and Geosciences, and lead on the CONVEX project, added: "We need to understand about possible changes to summer and winter rainfall so we can make informed decisions about how to manage these very different flooding risks in the future. The changes we have found are consistent with increases we would expect in extreme rainfall with increasing temperatures and will mean more flash floods.

"The next steps are to see if these changes are consistent with observed trends in summer rainfall extremes and changes projected by climate models in other parts of the world. We will be looking at this over the next five years, jointly with the Met Office and other leading international scientists in the European Research Council funded INTENSE project."

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